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WHAT COULD BE THE BEST CONTROL STRATEGY FOR B. INVADENS AND C. COSYRA IN W.A.?

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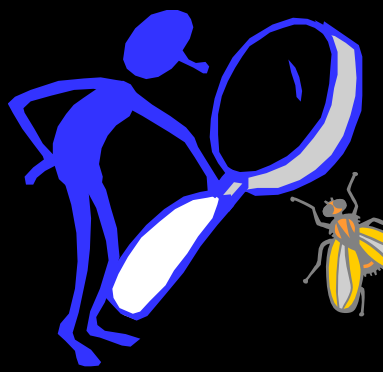
ECONOMIC IMPACT IN W.A.

- ✓ All West African countries (15) are dealing with that crucial fruit fly problematic: fruit fly complex (~ 10 species). For mangoes *B. invadens* and *C. cosyra* are the main FF species.

- ✓ Fruit flies are major constraints for all fruit value chains (including wild species) : mango, citrus, guava, cashew, sour sop, tropical plum, sheanut, African wild mango… Some fruit fly species are oligophagous as *Ceratitis cosyra*, others are polyphagous as *Bactrocera invadens* attacking more than 40 fruit species in Benin and especially mangoes and citrus fruits.

- ✓ Economic impact on mango value chain in Benin: losses on export cv range from ~15% (end March) to more than 80% (end June). Loss trend is similar in other W A countries while the fruit seasons are slightly different. Economic impact on citrus value chain is to be finalised.



ECONOMIC IMPACT ON MANGO VALUE CHAIN IN BENIN

- ✓ In 2006, estimated cultivated mango areas were ~ 2 300 ha (90% grafted (2 070 ha) and 10% non grafted (230 ha)).

- ✓ **Grafted mango losses in 2006.....3,4 t/ha**

  Non grafted mango losses in 2006.....2,2 t/ha

- ✓ **Total grafted mango losses in 2006 ..... 7 038 tonnes**

  Total non grafted mango losses in 2006..... 506 tonnes

- ✓ **Estimated grafted mango losses in 2006..... 422 280 000 FCFA**

  Estimated non grafted mango losses in 200... 12 650 000 FCFA

  TOTAL....434 930 000 FCFA = 663 000 € = ~ 966000 US$

What is it?

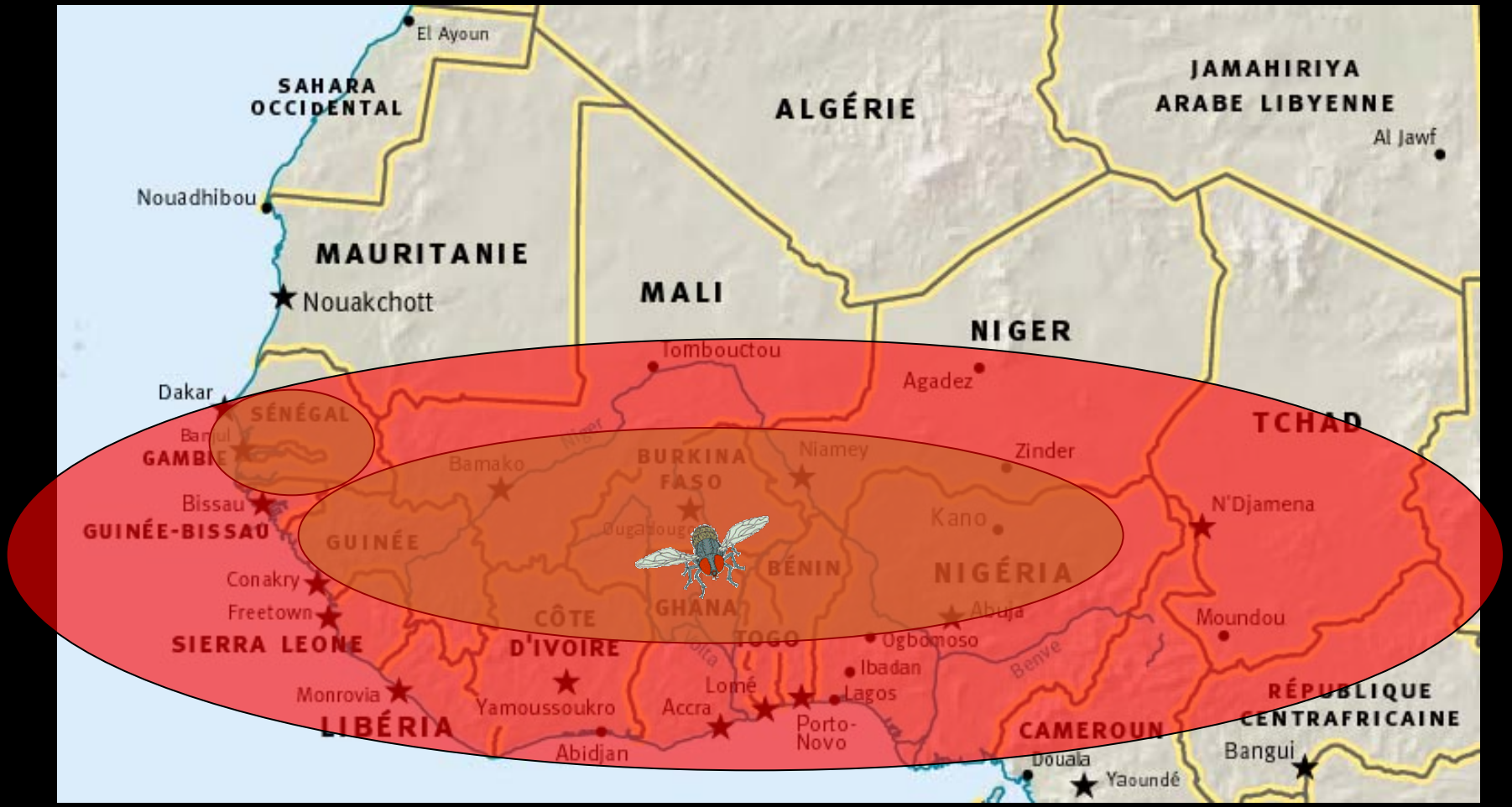
"Asian" species (Bactrocera invadens)

- **Alien species:** probably originated from India and Sri Lanka.

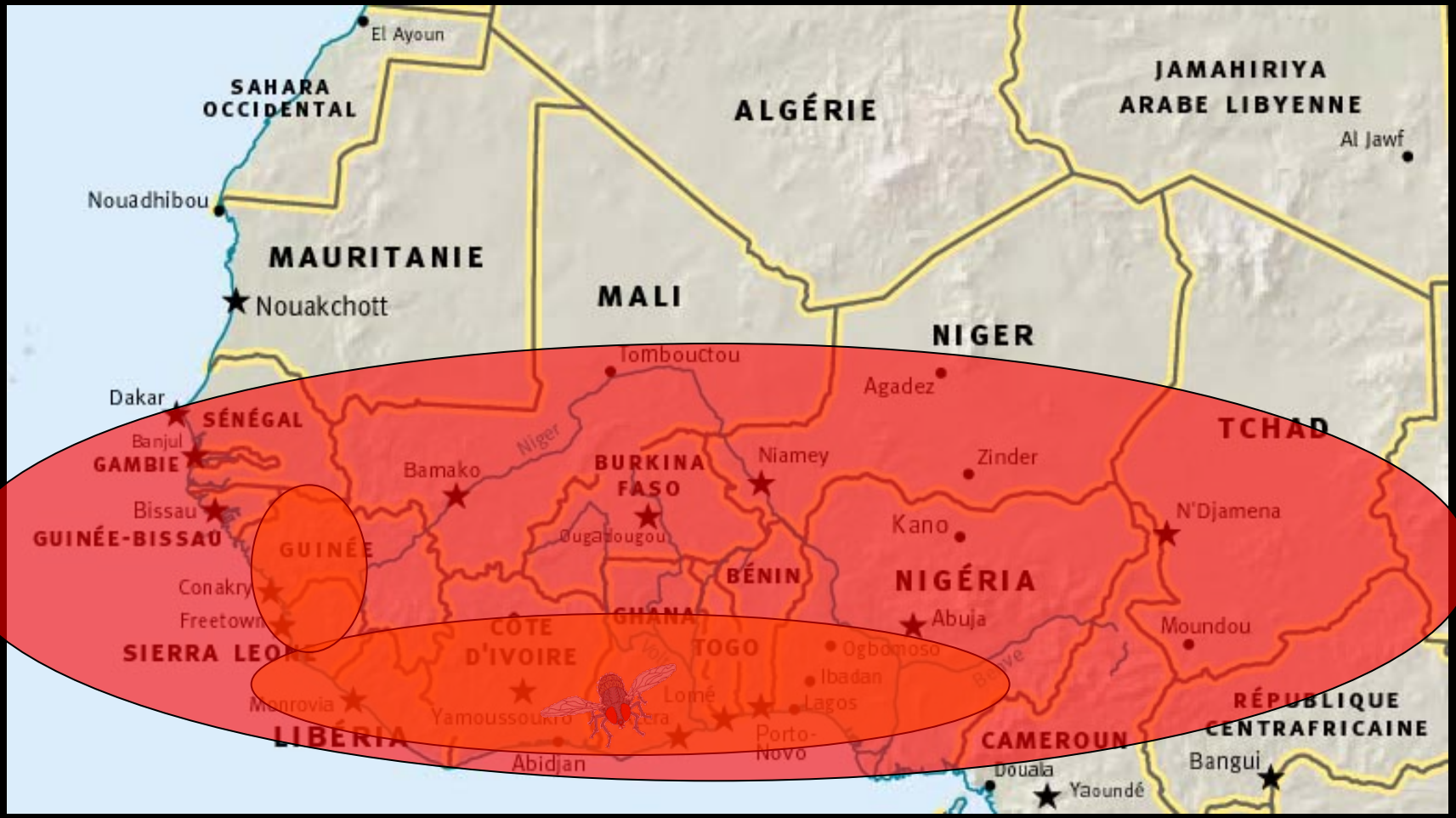
- **Species highly polyphagous** (targets: more than 40 species of fruit crops in Benin).

- **Alien species with high biotic potentialities** (> than those of native species).

Central zone of mango in West Africa and distribution of Bactrocera invadens



Central zone of citrus in West Africa and distribution of B. invadens



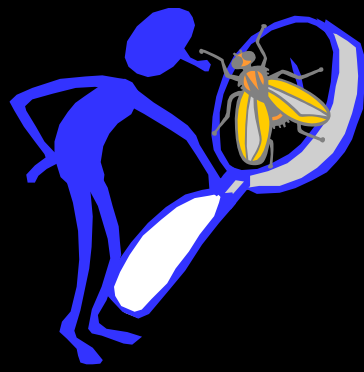
WHAT IS THIS ?

The Marula Fruit Fly (Ceratitis cosyra)

- **Mango pest in all Africa** (except Maghreb).
- **Polyphagous species** (12 fruit species in Benin).
- **Largely occurring on wild hosts…**
- **African species known by all growers.**
- **Very important.**

WHY THIS REGIONAL PROJECT?

- ✓ **First of all mangos are important food crops for West African populations**
- ✓ **Mango fruit flies are quarantine pest of great economic importance (as a barrier to export) occurring throughout West Africa.**
- ✓ **Economic impact of fruit flies: very important on mangoes but also on citrus, guava,**… as they are polyphagous species**.**
- ✓ **There is a need for global approach.**



GENERAL OBJECTIVE

The global objective of the W.A.F.F.I. is to enhance income generation through the efficient and environmentally sound management of fruit flies

in order to reach:

⇒ poverty reduction and sustainable livelihoods

⇒ food security in West Africa by the promotion of production of mangoes and other fruit value chains (Citrus…).

SPECIFIC OBJECTIVES

- ✓ **ORGANISATIONAL ASPECT:** facilitating establishment of national task force dealing with fruit fly problematic.

- ✓ **PRODUCTION ASPECT:** duplication and extension of first control techniques developed so as to deliver them to fruit growers' organisations.

- ✓ **RESEARCH ASPECT:**
  => Development of an « IPM-package » as no single control method has been able to guarantee sustainable control of fruit flies in W A.
  => Continuation of applied research activities on non validated control methods and also on life-history of *Bi* .

➢ Under an holistic approach of Tephritidae problematic.

MAIN FRUIT FLY CONTROL METHODS

=> Cultural by grafted ealier cv on late cv...

=> Prophylactic by collected damaged fruits…

=> Biological control with weaver ants (generalist predators).

=> Biological control with micro-wasps (native or exotic parasitoid species).

=> Biological control with entomopathogens.

=> Integrated Pest Management with GF 120 spot TTT, other bait sprays, MAT…

=> Post-harvest TTT with hot-water TTT.

The case of chemical control method

FACT STATE:

- **None of chemical pesticides has been registred for mango treatments.** Nonetheless cotton pesticides are used in mg orchards…
- **Chemical pesticides are too high-priced** (and scarce).
- **Chemical pesticides destroy natural enemies** (predators as well as parasitoids).
- **The use of chemical pesticides is a real threat for African growers**… and risky for exported products due to residues… !
- **Chemical pesticides are non effective against Tephritidae :** pesticides do not reach fruit fly eggs and larvae in the pulp of the fruit; the pupae are protected in the soil. Most of the adults are around the orchards…

=> THE OUTCOME IS REALLY NEGATIVE!

CONTROL STRATEGY FOR Bi & Cc

- **The IPM program** (sensu lato) **should integrate several compatible best bet technologies**, tested for sustainability with growers.

- For this control program to be effective, it should be planned in the whole production basin => “area wide management”.

- Only the most appropriate control methods should be together used in order to put fruit fly populations under the Economic Injury Level (E.I.L.).

RESULTS

The best-bet technologies against *B. invadens* and *C. cosyra* which are effective, and mutually compatible are:

=> Sanitation activities

=> Biocontrol activities with weaver ants

=> Biocontrol activities with parasitoids

=> Biocontrol activities with entomopathogens

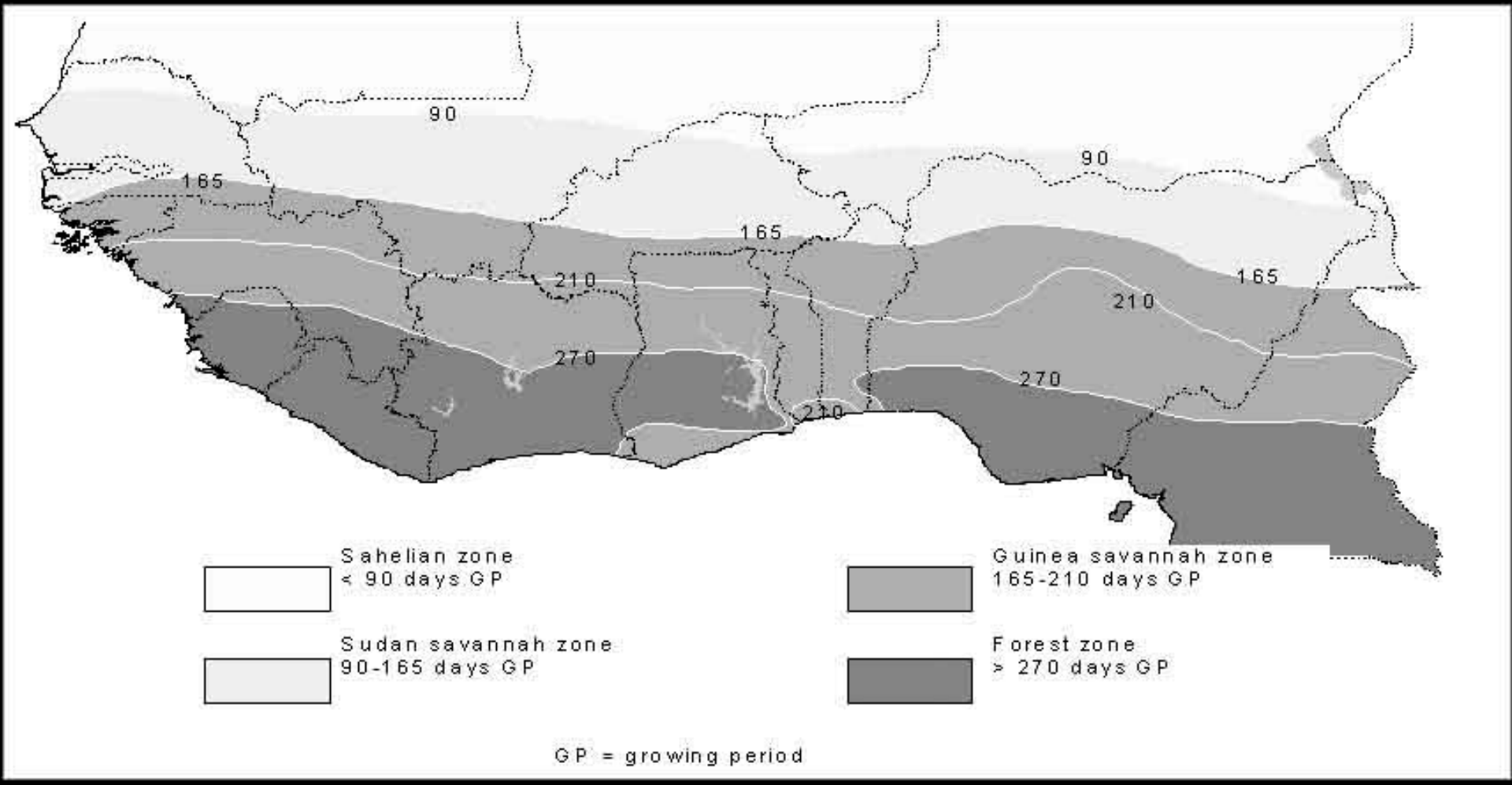
=> Spot treatments with GF-120

=> Other elements of IPM best-bet (bait-stations)…

=> Set up of new orchards with good technical package (site, cultivars, distance of plantation…).

MAIN AEZ in WA

Four main Agro-Ecological Zones in West Africa



PERSPECTIVES

But all these best-bet technologies cannot be used in these 4 main A.E.Z. in WA. Here are our positive results (XX) and the likely positive results (X) for perspectives of fruit fly control:

	Forest zone	Guinean savannah zone	Sudan savannah zone	Sahelian zone
Sanitation activities	X	XX	XX	X
Biocontrol with weaver ants	X	XX	XX	?
Biocontrol with parasitoids	X	X	?	?
Biocontrol with entomopath.	?	?	X	X
Spot treatments with GF-120	?	X	XX	X
Other IPM (bait stations...)	X	X	XX	X
General estimation of best-bet technologies / each major A.E.Z.	4	5	5	4

Best control strategy for Bi and Cc in WA

- **Privilegiate** the compatible best-bet technologies that are well adapted for each AEZ.

- **Test** the compatible best-bet technologies for sustainability with growers in each AEZ.

- **Disseminate** the compatible best-bet technologies that are well adapted for each AEZ.

- **Keep a detection trapping** with parapheromones (Met, Ter) attractants in each AEZ for the monitoring of *B. invadens* and *C. cosyra* populations.

COLLABORATIONS 2008 & 2009

- **Regional level in W. A. : Benin, Burkina Faso, Côte d'Ivoire,Ghana, Guinea, Mali, Senegal, Togo.**
- **Other African collaborations in C.A. and E.A.: Cameroon, R. of South Africa.**
- **International level : Washington (W.B.), Bruxelles (E.U.), Geneva (WTO), Tervuren (RMCA), London (TNM), Pavie (Univ. Pavie), Nairobi (*Icipe*).**
- **NGOs: Care, Espace Afrique, FAES...**
- **Internal level: CIRAD Reunion / PPP**

Thanks_

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Divecosys - Cotonou